

1.1 SSS Product Description

"This product shall provide information about identified shear and mesocyclone features. This product shall be generated from the output of the Mesocyclone Detection Algorithm. This product shall be generated in a format that can be used to generate an alphanumeric tabular display for an identified feature or all simultaneously, a graphic display or a graphic overlay to other products. This product shall be updated once per volume scan time. If on a particular volume scan there is no output from the Mesocyclone Detection Algorithm (i.e., no features of any type are identified), a version of the product shall be produced that exhibits the negative condition. This product shall include annotations for the product name, radar ID, date and time of volume scan, radar position, radar elevation above MSL, and radar operational mode. Upon user request, all site adaptable parameters identified as input to the algorithm(s) used to generate data for this product shall be available at the alphanumeric display."

"A Mesocyclone Rapid Update (MRU) version of this product shall be generated once per elevation scan time to provide updated Mesocyclone Detection Algorithm information. Current Mesocyclone Algorithm data at an elevation scan shall be based on the elevations that have been completed thus far in the current volume scan. This information shall be combined with Mesocyclone and Storm Track Algorithm information from the previous volume scan to form the MRU product. The average motion of all SCIT storm cells from the previous volume scan shall be used to derive a forecast position of each previous feature at the current volume scan time. In feature type order, the forecast position of each feature from the previous volume scan shall be matched to the closest feature from the current volume scan, within a search radius defined by SCIT algorithm adaptation data. Current 3D features which are not matched to a feature from the previous volume scan, shall be assigned the status of New. If previous volume scan data are unavailable, all features shall be reported as new. Current features shall inherit the attributes of the matched previous feature (associated storm ID, feature type, maximum tangential shear, height of maximum tangential shear, top height, base azimuth, base range, base height, azimuth diameter, range diameter). The position attributes (base azimuth, range, and height) of a previous feature matched to a current feature shall be updated to the current detection. If the top height of the matched feature is higher, the feature top height shall be updated. The position attributes of a previous feature not matched to a current feature, shall be set to the extrapolated forecast position. The status of unmatched previous features shall be assigned to Extrapolated. Strength attributes shall be updated if they increase in magnitude. The strength attributes are feature type and maximum tangential shear. If the maximum tangential shear is updated, the radial and azimuthal diameters and the height of the maximum tangential shear shall also be updated. Features with increasing strength attributes shall be assigned the status of Increasing. All other matched features shall be assigned the status of Persistent. Attribute data updated with current volume data shall be identified. At the end of the volume scan extrapolated features shall be removed. This product shall be generated in a format that can be used to generate an alphanumeric tabular display, a graphic display or a graphic overlay to other products. On alphanumeric displays, the status (Persistent,

Increasing, New, or Extrapolated) of each feature status shall be reported. In the graphic symbol display, features status shall be reported as either extrapolated or current. Current features include all features with a status of Increasing, Persistent, or New. If on a particular elevation scan there is no output (i.e., no features of any type are identified), a version of the product shall be produced that exhibits the negative condition. This product shall include annotations for the product name, radar ID, date and time of volume scan, elevation angle, radar position, radar elevation above MSL, and radar operational mode.”

1.2 Display Format

1.2.1 Graphic Display

The products **are** displayable in full- or quarter-screen format (see Appendix C).

1.2.1.1 Data Display

The mesocyclone or 3D correlated shear symbol will be placed directly over the position of the mesocyclone or shear at the lowest elevation scan in which it was detected.

For the MRU product: extrapolated mesocyclone and 3D correlated shear features will be displayed centered on the forecasted position at the lowest elevation scan it was previously detected. However, mesocyclone and 3D correlated shear features detected in the current volume scan will be displayed centered on the position of the matched current feature at the lowest angle in which it is detected. See also Appendix A, I(B)(4).

1.2.1.2 Range/Data Resolution

<u>Coverage Area (nmi radius)</u>	<u>Resolution (nmi x nmi)</u>	<u>Product Center</u>
0 to 124	N/A	Radar location

1.2.1.3 Graphic Overlay

As a graphic overlay to other products, it will be possible to display only the image portion of this product; that is, the screen right area annotations will not be displayed when the product is used as an overlay. Each mesocyclone will be identified with the associated storm ID in white. In overlay form, the mesocyclone and 3D shear symbol have pixel priority over all but the TVS symbol. The mesocyclone and 3D shear symbols, which are displayed in yellow, flash when displayed as overlays. The operator will have the option to stop the flashing of the mesocyclone symbol.

For the MRU version, the AWIPS operator will have the option to turn off display of extrapolated features.

1.2.2 Alphanumeric Display

An alphanumeric tabular product version is generated for display on the alphanumeric display. The format to be used is defined in Appendix C.

With the following exceptions, the format of the MRU graphic attribute and alphanumeric tabular portions of the product will follow the non-rapid update Mesocyclone product: feature status will be reported as EXT, PER, INC, and, NEW to

denote extrapolated, persistent, increasing, and new features, respectively; and the character ^ (hexadecimal value 5E) will be placed next to data which was computed from current volume scan detections. The format to be used is defined in Appendix B and C.

1.3 Annotations

1.3.1 Alphanumeric

Standard annotations

Site Adaptable Parameters for the non-rapid update version

Elevation angle for the MRU version

All annotations (except for Radar position) with the alphanumeric product format will be included in the message.

1.3.2 Special Symbols

The mesocyclone will be displayed (centered on the location of the mesocyclone at the lowest elevation angle in which it is detected) as a yellow open circle, whose perimeter is 4 pixels thick. The size of the symbol will be proportional to the average of the mesocyclone radial and azimuthal diameters. The minimum size symbol will be a circle having a diameter of 7 pixels.

The 3D correlated shear will be displayed as a yellow open circle, 1 pixel thick and is centered (similarly to the mesocyclone) on the 3D shear center at the lowest elevation angle at which it was detected. The size will be proportional to the average diameter. The minimum size symbol will be a circle having a diameter of 7 pixels.

For the MRU version, AWIPS will distinguish between the Mesocyclone and 3D correlated shear features by the thickness of the perimeter of a circle (i.e., thick perimeter is a Mesocyclone and thin for 3D Correlated Shear). In addition, AWIPS will distinguish between current (new, persistent, and increasing) and extrapolated (unmatched) 3D features by the line style of the circle perimeter (i.e., traditional AWIPS mesocyclone and 3D Correlated shear symbols are used for current features, but symbols with a dashed perimeter are used for extrapolated features).

1.4 Product Interaction

This product is displayable as an overlay on all geographically based products. For the MRU version, the AWIPS operator will be provided the option to choose between displaying the latest elevation (i.e., highest elevation) and displaying a specific elevation; when the latest elevation is selected, the display will automatically update when higher elevation products are received.

1.5 Comments

All site adaptable parameters identified as inputs to the algorithm used to generate data for this product will be available for display at the applications terminal upon user request. See 12.8 for the format description.

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Appendix A

(B) Special Symbols and Characters

(4) Mesocyclone

The mesocyclone will be displayed (centered on the location of the mesocyclone at the lowest elevation angle in which it is detected) as a yellow open circle, whose perimeter is 4 pixels thick. The size of the symbol will be proportional to the average of the mesocyclone radial and azimuthal diameters. The minimum size symbol will be a circle having a diameter of 7 pixels. See section 20.3.2 for MRU special symbol product requirements.

(5) Correlated 3D Shear

The 3D correlated shear will be displayed as a yellow open circle 1 pixel thick and is centered (similarly to the mesocyclone) on the 3D shear center at the lowest elevation angle at which it was detected. The size will be proportional to the average diameter. The minimum size symbol will be a circle having a diameter of 7 pixels. See section 20.3.2 for MRU special symbol product requirements.

II. Standard and Product Specific Annotation Display

(4) Display of Storm Attribute Data

Configuration 2B, associated with the Mesocyclone Rapid Update (MRU) product closely follows the Mesocyclone product. Differences are described in section 20.2.2. The table outline for the MRU attribute data shall be *color*. The MRU product is a standalone product as well as an overlay product and the manner in which Configuration 2B is handled is the same as that of Configuration 1.

TABLE III. STANDARD ABBREVIATIONS

<u>SS Products</u>	<u>Abbreviations</u>
Mesocyclone Rapid Update	MRU

Appendix B

CONF 2B	STATUS/ID	XXX / XX		<u>NTR 20 MESOCYCLONE RAPID UPDATE</u> FEATURES ARE 1. MESO (MESOCYCLONE) 2. 3 DC SHR (3D CORRELATED SHEAR) NOTE: STORMS WITH MESOCYCLONES HAVE PRIORITY
	FEATURE	XXXXXXXX^		
	AZ RAN	XXX ^ XXX		
	BASE TOP	XX.X^XX.X		
	RAD AZDIA	XX.X^XX.X		

Format III. Attribute Area

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Appendix C

MESOCYCLONE RAPID UPDATE									
RADAR ID: NNN			DATE: MM/DD/YY		TIME: HH:MM:SS		Elev: xx.x deg		
FEATURE STATUS	STORM ID	FEATURE TYPE	BASE kft	TOP kft	AZRAN deg-nm	HGT kft	DIAM RAD	(NM) AZ	SHEAR (E-3/
EXT	XX	MESO	HH.H	HH.H	DDD/XXX	HH.H	XXX	XXX	XXX
PER	XX	MESO	HH.H^	HH.H	DDD/XXX^	HH.H	XXX	XXX	XXX
INC	XX	MESO ^	HH.H^	HH.H	DDD/XXX^	HH.H	XXX	XXX	XXX
INC	XX	3DC SHR	HH.H^	HH.H	DDD/XXX^	HH.H^	XXX^	XXX	XXX^
INC	XX	3DC SHR^	HH.H^	HH.H	DDD/XXX^	HH.H^	XXX^	XXX	XXX^
EXT	XX	UNC SHR	HH.H	HH.H	DDD/XXX^	HH.H	XXX	XXX	XXX
XXX	XX	UNC SHR	HH.H	HH.H^	DDD/XXX	HH.H	XXX	XXX	XXX
XXX	XX	UNC SHR	HH.H	HH.H	DDD/XXX	HH.H	XXX	XXX	XXX
XXX	XX	UNC SHR	HH.H	HH.H	DDD/XXX	HH.H	XXX	XXX	XXX
XXX	XX	UNC SHR	HH.H	HH.H	DDD/XXX	HH.H	XXX	XXX	XXX

Format IIIb. Mesocyclone Rapid Update (Sheet 1 of 1)

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